

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3, 6-13 and 16-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Wang (US 6,395,152 B1).

3. In regards to claim(s) 1-3, 6-13 and 16-20, Wang'152 discloses a method of and an apparatus capable of electropolishing a metal layer formed on a wafer comprising aligning a nozzle adjacent to the center portion of the layer, rotating the wafer, and, as the wafer is rotated, applying a stream of electrolyte from the nozzle onto a portion of the metal layer adjacent the center portion to begin to expose an underlying layer that is a barrier layer and to continue the polishing while moving the nozzle from the center portion to an edge portion of the wafer. Examiner notes that such a method of electropolishing would inherently result in a triangular polishing profile with the nozzle applying electrolyte progressively outwards in the radial direction as the nozzle moves (Figs. 28A-31B; col. 12, lines 4-25; col. 25, line 21 to col. 27, line 38).

4. Claims 1-4, 6-14 and 16-20 are rejected under 35 U.S.C. 102(b) as being anticipated by WO01/88229 in which US 7,136,173 is used in reference to.

5. In regards to claim(s) 1-3, 6-13 and 16-20, WO'229 discloses a method of and an apparatus capable of electropolishing a metal layer formed on a wafer comprising

Art Unit: 1795

aligning a nozzle adjacent to the center portion of the layer, rotating the wafer, and, as the wafer is rotated, applying a stream of electrolyte from the nozzle onto a portion of the metal layer adjacent the center portion to begin to expose an underlying layer that is a barrier layer and to continue the polishing while moving the nozzle from the center portion to an edge portion of the wafer. Examiner notes that such a method of electropolishing would inherently result in a triangular polishing profile with the nozzle applying electrolyte progressively outwards in the radial direction as the nozzle moves (Figs. 28A-31B; col. 12, lines 46-67; col. 37, line 6 to col. 39, line 22).

6. In regards to claim(s) 4 and 14, WO'229 discloses a method of and an apparatus capable of controlling the polishing current while processing, and further indicates that the such a polishing current changes while processing, therefore meeting the claims because such processing includes while the nozzle translates radially about the wafer (col. 45, lines 29-51).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 5 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang'152 or WO'229 as stated above, and in view of Datta et al. (US 6,103,096 A).

9. Wang'152 and WO'229 does not explicitly disclose a method of or an apparatus capable of changing the nozzle size while electropolishing a wafer.

Art Unit: 1795

10. Datta et al. discloses a method of and an apparatus capable of electropolishing a wafer with multiple nozzle sizes (col. 2, lines 26-41). It would have been obvious to one of ordinary skill in the art to modify Wang'152 or WO'229's method of or apparatus capable of electropolishing a wafer with varying nozzle sizes at different radial positions to compensate for edge effects while processing (Datta et al., col. 2, lines 26-41).

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to NICHOLAS A. SMITH whose telephone number is (571)272-8760. The examiner can normally be reached on 8:30 AM to 5:00 PM, Monday through Friday.

12. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on (571)-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1795

13. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Harry D Wilkins, III/
Primary Examiner, Art Unit 1795

NAS